

What Is Claimed Is:

1. A seasoning system for coating a food product with seasoning, comprising:
a product tray driven to move the food product longitudinally along the tray;
a drive mechanism for driving the product tray;
5 a sensor for sensing an upper level of product moving along the product tray and
producing a product feed rate signal functionally related to the volume of product being
conveyed along the product tray; and
a seasoning supply unit for supplying seasoning to the product moved by the
product tray in response to the product feed rate signal.
- 10 2. The seasoning system as defined in Claim 1, wherein the drive mechanism
moves the product tray linearly in a slow forward/fast backward manner to slide the product
along the product tray.
3. The seasoning system as defined in Claim 2, wherein the seasoning supply
unit comprises:
15 a seasoning tray having an angled discharge edge for uniformly distributing a curtain
of seasoning to the product.
4. The seasoning system as defined in Claim 3, wherein the seasoning tray is
fixed to the product tray.
- 20 5. The seasoning system as defined in Claim 3, further comprising:
an angled deflector on an upstream portion of the seasoning tray for deflecting
product toward both a left side and a right side of the seasoning tray.

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6. The seasoning system as defined in Claim 1, wherein the seasoning supply unit further comprises an auger driven by an auger motor, the auger motor speed being controlled in response to the product feed rate signal.

5 7. The seasoning system as defined in Claim 1, further comprising:
a proportional gate for adjusting the feed rate of product to the product tray in response to the product feed rate signal.

8. The seasoning system as defined in Claim 1, further comprising:
a tumbler including a rotating drum having an inclined drum axis for tumbling the product and the seasoning.

10 9. The seasoning system as defined in Claim 8, further comprising:
a cross feed conveyor for receiving the product from the tumbler and outputting product to downstream equipment.

15 10. The seasoning system as defined in Claim 1, further comprising:
another product tray for moving product longitudinally along the another product tray while a spray mechanism sprays a liquid on the product; and
another drive mechanism for driving the another product tray.

11. The tumble seasoning system as defined in Claim 10, further comprising:
a rotating drum for rotating sprayed product; and
a tumbler drive motor for rotating the drum.

20 12. The seasoning system as defined in Claim 11, wherein the rotating drum moves linearly with the another product tray driven by the another drive mechanism.

13. The seasoning system as defined in Claim 11, further comprising:
a plastic material liner for fitting within the rotating drum.

14. The seasoning system as defined in Claim 13, wherein the plastic material
liner includes a plurality of inwardly projecting ribs each having first and second flight
5 surfaces for tumbling the rotating product as a function of the rotational direction of the
tumbler drive motor.

15. The seasoning system as defined in Claim 1, further comprising:
an air supply unit;
one or more air knives for blowing air to move the seasoning relative to the product
10 and thereby coat the product with seasoning discharged from the seasoning supply unit.

16. The seasoning system as defined in Claim 17, wherein the product falls by
gravity past the one or more air knives.

17. The seasoning system as defined in Claim 16, wherein the product falls
unobstructed from an upper drop off location past the air knives and to downstream
15 equipment.

18. The seasoning system as defined in Claim 16, wherein the seasoning unit
further comprises:

an upper ramp surface for sliding the food product while coating a side of the food
product; and

20 a lower ramp surface for sliding the food product while coating an opposing side of
the food product.

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19. The seasoning system as defined in Claim 18, further comprising:
an upper seasoning tray for dropping season onto the upper ramp surface; and
a lower seasoning tray for dropping seasoning onto the lower ramp surface.

5 20. The seasoning system as defined in Claim 1, further comprising:
an operator input panel for inputting operator selected parameters; and
a computer for controlling movement of the product tray and thus the quantity of
product moving along the product tray in response to the operator input signals.

21. The seasoning system as defined in Claim 1, wherein the sensor senses an
upper level of the product moving along the product tray without contacting the product.

10 22. The seasoning system as defined in Claim 1, further comprising:
a second product tray for moving product longitudinally along the second product
tray; and
a product deflector for inverting the product discharged from the product tray and
input to the second product tray.

15 23. The seasoning system as defined in Claim 22, wherein the drive mechanism
powers both the product tray and the second product tray, and the second product tray
moves product longitudinally in a reverse direction from product movement provided by the
product tray.

20 24. The seasoning system as defined in Claim 22, further comprising:
a first spray mechanism for spraying a first side of the product moving along the first
product tray; and

a second spray mechanism for spraying an inverted side of the product moving along the second product tray.

25. A seasoning system for coating a food product with seasoning, comprising:
a product tray driven to move the food product longitudinally along the tray;
5 a drive mechanism for driving the product tray;
a seasoning unit for applying a seasoning to the product moved by the product tray;
a sensor for sensing an upper level of product moving along the product tray and
producing a product feed rate signal functionally related to the volume of product being
conveyed along the product tray; and
10 a proportional gate for adjusting the feed rate of product to the tray in response to
the product feed rate signal.

26. The seasoning system as defined in Claim 25, wherein the drive mechanism
moves the product tray linearly in a slow forward/fast backward manner to slide the product
along the product tray.

15 27. The seasoning system as defined in Claim 25, further comprising:
a tumbler including a rotating drum having an inclined drum axis for tumbling the
product and the seasoning.

28. The seasoning system as defined in Claim 27, further comprising:
another product tray for moving product longitudinally along the another product tray
20 while a spray mechanism sprays a liquid on the product.

29. The seasoning system as defined in Claim 25, further comprising:
an operator input panel for inputting operator selected parameters; and

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a computer for controlling movement of the product tray in response to the operator input signals.

30. The seasoning system as defined in Claim 25, further comprising:

a second product tray for moving product longitudinally along the second product tray; and

a product deflector of inverting the product discharged from the product tray and input to the second product tray.

31. The seasoning system as defined in Claim 30, wherein the drive mechanism powers both the product tray and the second product tray, and the second product tray moves product longitudinally in a reverse direction from product movement provided by the product tray.

32. A seasoning system for coating a food product with seasoning, comprising:
a first product tray driven to move the food product longitudinally along the first tray;
a drive mechanism for driving the first product tray linearly in slow forward/fast backward manner to slide the product along the first product tray;
a second product tray for moving product longitudinally along the length of the second product tray; and
a deflector for inverting the product discharged from the first product tray and input to the second product tray.

33. The seasoning system as defined in Claim 32, wherein the drive mechanism powers both the product tray and the second product tray, and the second product tray moves product longitudinally in a reverse direction from product movement provided by the product tray.

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34. The seasoning system as defined in Claim 32, further comprising:
a first seasoning tray for delivering a curtain of seasoning to the first product tray;

and

a second seasoning tray for delivering a curtain of seasoning to the second product

5 tray.

35. The seasoning system as defined in Claim 34, further comprising:
a first seasoning supply unit for delivering seasoning to the first product tray; and
a second seasoning supply unit for delivering seasoning to the second product tray.

10 36. The seasoning system as defined in Claim 35, further comprising:
a sensor for sensing an upper level of product moving along one of the first product
tray and second product tray and producing a product feed rate signal functionally related
to the volume of product being conveyed along the one of the first product tray and second
product tray; and

15 the output from the first supply unit and the second supply unit is controlled in
response to the product feed rate signal.

37. The seasoning system as defined in Claim 32, further comprising:
an operator input panel for inputting operator selected parameters; and
a computer for controlling movement of the product tray and thus the quantity of
20 product moving along the product tray in response to the operator input signals.

38. A seasoning unit for coating a food product with seasoning, comprising:
one or more moveable seasoning trays each for dispensing seasoning;
an input conveyor for supplying food product to fall by gravity past the one or more
seasoning trays to coat the food product with seasoning.

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39. The seasoning system as defined in Claim 38, further comprising:
at least one air knife for blowing compressed air on the seasoning to move the
seasoning relative to the food product to more uniformly coat the food product.

5 40. The seasoning system as defined in Claim 39, further comprising:
an enclosure for at least substantially housing the at least one air knife;
an air supplying unit for supplying compressed air to the at least one or more air
knife; and
a flow line for circulating air between the enclosure and the air supply unit.

10 41. The seasoning system as defined in Claim 40, further comprising:
a filter unit positioned along the flow line.

42. The seasoning system as defined in Claim 42, wherein the product falls
unobstructed from an upper drop off location past the at least one air knife and to
downstream equipment.

15 43. The seasoning system as defined in Claim 42, wherein the seasoning unit
further comprises:
an upper ramp surface for sliding the food product while coating a side of the food
product; and
a lower ramp surface for sliding the food product while coating an opposing side of
the food product.

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44. The seasoning system as defined in Claim 43, further comprising:
an upper seasoning tray for dropping season onto the upper ramp surface; and a lower
seasoning tray for dropping seasoning onto the lower ramp surface.

45. The seasoning system as defined in Claim 38, wherein the one or more
seasoning tray includes at least first and second linearly moveable seasoning trays to
move seasoning longitudinally along the seasoning tray; and
a drive mechanism for driving the first and second seasoning trays.

46. The seasoning system as defined in Claim 45, wherein the first seasoning
tray opposes the second seasoning tray such that the first seasoning tray primary coats
one side of the product and the second seasoning tray primarily coats an opposing side
of the product.

47. The seasoning tray system as defined in Claim 38, wherein the input
conveyor comprises:

a linearly moveable product tray driven to move the food product longitudinally along
the tray;
a drive mechanism for driving the tray.

48. An improved tumble drum for mixing a food product with another food
product, the tumble drum comprising:

a rotating tumble drum for rotating the product and the another food product;
a tumbler drive motor for rotating the tumble drum; and
another drive motor for reciprocating the tumble drum linearly in a slow
forward/backward manner to slide product along the tumble drum and thereby discharge
the product from the tumble drum.

49. The improved tumble drum as defined in Claim 48, further comprising:
a product tray driven to move food product longitudinally along the product tray; and
the rotating tumble drum being fixed to the product tray such that the drive
mechanism linearly moves both the tumble drum and the product tray in a slow
5 forward/backward manner to move product along both the product tray and the rotating
tumble drum.

50. The improved tumble drum as defined in Claim 49, further comprising:
a sensor for sensing an upper level product moving along the product tray and
producing product feed signal function related to the volume of product being conveyed
10 along the product tray; and
powering the drive mechanism in response to the product feed rate signal.

51. The improved tumble drum as defined in Claim 48, further comprising:
a spray mechanism for spraying product with the another food product within the
tumble drum.

15 52. The improved tumble drum as defined in Claim 48, further comprising:
a plastic material liner for fitting within the tumble drum.

53. The improved tumble drum as defined in Claim 52, wherein:
the plastic material liner includes a plurality of inwardly projecting ribs each having
first and second flight surfaces for tumbling the rotating product as a function of the
20 rotational direction of the tumbler drive motor.

54. An improved liner for a tumble drum, comprising:
a generally sleeve-shaped tumbler drum body;

a plurality of circumferentially spaced ribs each fixed to the body, each rib having first and second flight surfaces for tumbling the rotating product as a function of the rotational direction of a tumbler drive motor.

5 55. An improved seasoning supply unit for supplying seasoning to a product, comprising:

a seasoning tray having a substantially planar floor with an angled discharge edge for uniformly distributing a curtain of seasoning to the product; and

a drive mechanism for driving the seasoning tray linearly in a slow forward/backward manner to slide the seasoning along the seasoning tray.

10 56. The seasoning supply unit as defined in Claim 55, further comprising:
an angled deflector on a upstream portion of the seasoning tray for deflecting product toward both the left side and the right side of the seasoning tray.

15 57. The seasoning supply unit as defined Claim 55, further comprising:
the seasoning tray including a tray side on one side of the floor, the tray floor having
a generally triangular configuration; and
the tray floor having a planar supporting surface at a selected inclination with respect to a horizontal plane for uniformly distributing seasoning onto the product.

20 58. The seasoning supply unit as defined in Claim 57, wherein the triangular configuration of the floor extends laterally across at least a substantial portion of a product tray beneath the seasoning tray; and
the side wall of the seasoning tray is at a selected angle with respect to a plane perpendicular to a line of product travel along the product tray.

59. The seasoning supply unit as defined in Claim 55, further comprising:
a centering device having a pair of inclined surfaces for centering the seasoning
before engaging the floor of the seasoning tray.

60. The seasoning supply unit as defined in Claim 55, wherein the seasoning tray
includes a substantially triangular-shaped floor including the angled discharge edge for
uniformly distributing seasoning onto the product; and
a dispersion member positioned below the floor of the seasoning tray and secured
thereto, such that seasoning drops from the angled discharge edge of the floor of the
seasoning tray and engages the dispersion member then drops onto the product.

61. The seasoning supply unit as defined in Claim 60, further comprising:
the dispersion member having a non-linear discharge surface, such that product
drops off the floor of the seasoning tray and engages the dispersion member, and some
seasoning engaged by the non-uniform surface of the dispersion member is engaged by
the non-linear surface during reciprocation of the seasoning tray for distributing seasoning
on the product.

62. The seasoning supply unit as defined in Claim 61, wherein the non-linear
discharge surface has a substantially sinusoidal configuration.

63. The seasoning supply unit as defined in Claim 55, wherein the seasoning tray
includes a substantially triangular-shaped floor including the angled discharge edge for
uniformly distributing seasoning onto the product; and
a dispersion plate positioned below the floor of the seasoning tray and secured
thereto, such that seasoning drops off the floor of the seasoning tray and some passes to
a left side and some to a right side of the dispersion plate onto the product.

64. The seasoning supply unit as defined in Claim 55, wherein the seasoning tray includes a substantially triangular-shaped floor including the angled discharge edge for uniformly distributing seasoning onto the product; and

an elongate dispersion bar positioned below the floor of the seasoning tray and secured thereto, the dispersion bar having a central axis parallel with the angled discharge edge, such that seasoning drops off the floor of the seasoning tray and some passes to a left side and some to a right side of the dispersion bar onto the product.

65. The seasoning supply unit as defined in Claim 55, wherein the seasoning tray includes a substantially triangular-shaped floor including the angled discharge edge for uniformly distributing seasoning onto the product;

a roller positioned below the floor of the seasoning tray and rotatable about a central axis substantially parallel to the angled discharge edge; and

a roller power unit for rotating the roller.

66. The seasoning supply unit as defined in Claim 65, further comprising:
the roller including one or more grooves for temporarily receiving seasoning therein.

67. The seasoning supply unit as defined in Claim 55, wherein the seasoning tray includes a hood for protecting seasoning moving along the floor of the seasoning tray.

68. A method of coating a food product with seasoning, comprising:
powering a product tray to move the food product longitudinally along the tray in a slow forward/fast backward manner ;

sensing an upper level of product moving along the product tray and producing a product feed rate signal functionally related to the volume of product being conveyed along the product tray; and

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supplying seasoning to the product moved by the product tray in response to the product feed rate signal.

69. The method as defined in Claim 68, wherein supplying seasoning comprises:
uniformly distributing a curtain of seasoning the product.

5 70. The method as defined in Claim 59, wherein supplying seasoning comprises:
controlling an auger driven by an auger motor in response to the product feed rate
signal.

71. The method as defined in Claim 68, further comprising:
adjusting the feed rate of product to the product tray in response to the product feed
10 rate signal.

72. The method as defined in Claim 68, further comprising:
tumbling the product and the seasoning.

73. The method as defined in Claim 68, further comprising:
powering another product tray for moving product longitudinally along the another
15 product tray while a spray mechanism sprays a liquid on the product.

74. The method as defined in Claim 73, further comprising:
tumbling the sprayed product.

75. The method as defined in Claim 68, further comprising:
inputting operator selected parameters to a computer; and

automatically controlling movement of the product tray and thus the quantity of product moving along the product tray in response to the operator input signals.

76. The method as defined in Claim 68, further comprising:
moving product longitudinally along a second product tray; and
5 automatically inverting the product discharged from the product tray and input to the second product tray.

77. The method as defined in Claim 76, further comprising:
spraying a first side of the product moving along the first product tray; and
spraying an inverted side of the product moving along the second product tray.

10 78. A method of coating a food product with seasoning, comprising:
powering a product tray to move the food product along the tray longitudinally in a slow forward/fast backward manner;
applying a seasoning to the product moved by the product tray;
sensing an upper level of product moving along the product tray and producing a
15 product feed rate signal functionally related to the volume of product being conveyed along the product tray; and
adjusting the feed rate of product to the tray in response to the product feed rate signal.

20 79. The method as defined in Claim 78, further comprising:
powering another product tray for moving product longitudinally along the another product tray while a spray mechanism sprays a liquid on the product.

80. The method as defined in Claim 78, further comprising:
inputting operator selected parameters to a computer; and
automatically controlling movement of the product tray in response to the operator
input signals.

5 81. The method as defined in Claim 78, further comprising:
powering a second product tray for moving product longitudinally along the second
product tray; and
inverting the product discharged from the product tray and input to the second
product tray.

10 82. The method as defined in Claim 81, wherein a single drive mechanism
powers both the product tray and the second product tray, and the second product tray
moves product longitudinally in a reverse direction from product movement provided by the
product tray.

15 83. A method of mixing a food product with another food product, the method
comprising:
rotating the product and the another food product in a tumble drum; and
reciprocating the tumble drum linearly in a slow forward/backward manner to slide
product along the tumble drum and thereby discharge the product from the tumble drum.

20 84. The method as defined in Claim 83, further comprising:
driving a product tray to move the product longitudinally along the product tray; and
fixing the tumble drum to the product tray such that both the tumble drum and the
product tray move in a slow forward/backward manner to move product along both the
product tray and the tumble drum.

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85. The method as defined in Claim 84, further comprising:
sensing an upper level product moving along the product tray and producing product
feed signal function related to the volume of product being conveyed along the product
tray; and
5 powering the drive mechanism in response to the product feed rate signal.

86. The method as defined in Claim 83, further comprising:
spraying the product with a liquid.

87. A method for supplying seasoning to a product, comprising:
powering a seasoning tray linearly in a slow forward/backward manner to slide the
10 seasoning along the seasoning tray, the seasoning tray having a substantially planar floor
with an angled discharge edge for uniformly distributing a curtain of seasoning to the
product.

88. The method as defined in Claim 86, further comprising:
deflecting product toward both the left side and the right side of the seasoning tray.

89. The method as defined in Claim 86, further comprising:
the seasoning tray including a tray side on one side of the floor, the tray floor having
a generally triangular configuration; and
15 inclining the tray floor at a selected inclination with respect to a horizontal plane for
uniformly distributing seasoning onto the product.

90. The method as defined in Claim 86, further comprising:
centering the seasoning before engaging the floor of the seasoning tray.

91. The method as defined in Claim 86, wherein the seasoning tray includes a substantially triangular-shaped floor including the angled discharge edge for uniformly distributing seasoning onto the product; and

positioning a dispersion member below the floor of the seasoning tray, such that
5 seasoning drops off the floor of the seasoning tray and some passes to a left side and some to a right side of the dispersion member onto the product.

92. A method of coating a food product with seasoning, comprising:
powering a product tray to move the food product longitudinally along the tray;
sensing an upper level of product moving along the product tray and producing a
10 product feed rate signal functionally related to the volume of product being conveyed along the product tray;

supplying seasoning to the product moved by the product tray in response to the product feed rate signal;

periodically testing a selected volume of seasoned product with a standard; and
15 altering at least one of the food product volume moving along the product tray and the seasoning rate applied to the food product in response to a periodic test.

93. The method as defined in Claim 86, wherein the product tray is moved linearly in a slow forward/fast backward manner to slide the product along the product tray.

94. The method as defined in Claim 92, wherein supplying seasoning comprises:
20 uniformly distributing a curtain of seasoning to the product.

95. The method as defined in Claim 92, wherein altering the food product volume comprises:

adjusting the feed rate of product to the product tray in response to the product feed rate signal.

96. The method as defined in Claim 92, further comprising:

inputting operator selected parameters to a computer; and

5 automatically controlling movement of the product tray and thus the quantity of product moving along the product tray in response to the operator input signals.

97. The method as defined in Claim 92, further comprising:

spraying a first side of the product moving along the first product tray; and

spraying an inverted side of the product moving along the second product tray.